

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



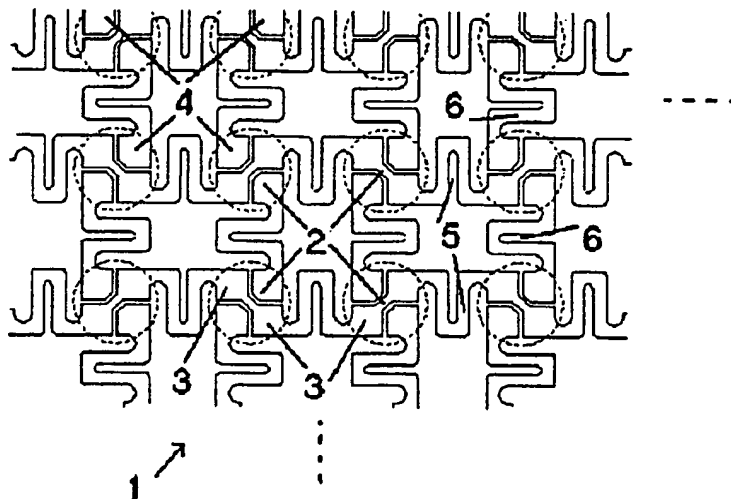
(43) International Publication Date
26 June 2003 (26.06.2003)

PCT

(10) International Publication Number
WO 03/052368 A1

- (51) International Patent Classification⁷: **G01L 1/20** **Edmond [NL/NL]; M.H. Tromplaan 230, NL-2341 Oegstgeest (NL).**
- (21) International Application Number: **PCT/NL02/00816**
- (22) International Filing Date:
11 December 2002 (11.12.2002)
- (74) Agent: **VAN BREDA, Jacques; Octrooibureau Los En Stigter B.V., Weteringschans 96, NL-1017 XS Amsterdam (NL).**
- (25) Filing Language: **Dutch** (81) Designated State (national): **US.**
- (26) Publication Language: **English** (84) Designated States (regional): **European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR).**
- (30) Priority Data:
1019607 19 December 2001 (19.12.2001) **NL**
- (71) Applicant (for US only): **DUTCH SPACE B.V. [NL/NL]; Newtonweg 1, NL-2333 CP Leiden (NL).**
- Published:
— with international search report
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **HOLMAN, Albert,**
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **SENSOR MAT FOR REGISTERING A PRESSURE PROFILE**



(57) Abstract: The invention relates to a sensor mat for registering a pressure profile, comprising sensor elements distributed over the mat wherein each sensor element has a first and a second electrode, which two electrodes interact with a resistive layer, such that a pressure load changes the electrical resistance between the two electrodes relative to the resistance at zero load, wherein the sensor elements are provided on a flexible carrier in the form of a matrix and wherein the sensor elements that are placed in the same row or in the same column always share one row electrode or column electrode, respectively. Each row electrode and/or column electrode between the sensor elements has a meandering path.

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Sensor mat for registering a pressure profile

The invention relates to a sensor mat for registering a pressure profile, comprising sensor elements distributed over the mat, wherein each sensor element has a first and a second electrode, which two electrodes interact with a resistive layer such that a pressure load changes the electrical resistance between the two electrodes relative to the resistance at zero load, wherein the sensor elements are provided on a flexible carrier in the form of a matrix and wherein the sensor elements that are placed in the same row or in the same column always share one row electrode or column electrode, respectively.

Such a sensor mat is known, for example, from US-A-4,734,034. The known sensor mat has a top layer and a bottom layer in which electrodes are arranged in rows or columns, respectively. Between the top layer and the bottom layer there is a separating layer. Further, the electrodes of top layer and bottom layer are provided with a resistive coating. When applying a load to the mat it is possible to determine with the aid of the electrodes where on the mat the pressure load is applied because the effect of the pressure load changes the resistance between the electrodes. The known sensor mat is especially suitable for determining the pressure profile of teeth placed on both sides of the mat.

The object of the invention is to provide a sensor mat that is suitable for registering pressure profiles from persons and/or objects in chairs, beds or in connection with the use of medical aids. The sensor mat has to meet special requirements, for example, when the sensor mat does not have a solid supporting surface. A particular requirement with the applications mentioned is that the sensor mat must be able to tolerate a double bend without detracting from the accuracy of the determination, or causing folds in the carrier or a break in one or several of the row electrodes and/or column electrodes.

In accordance with the invention this requirement is met by embodying the sensor mat such that each row electrode

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and/or column electrode between the sensor elements has a meandering path. When the flexible carrier on which the sensor elements are provided bends in two directions, the meandering portions of the electrodes will be able to move
5 outside the plane of the carrier while actually staying intact but nevertheless allowing the sensor elements to move in relation to one another. The measure in which a double bend is tolerated may then be chosen by suitably adjusting the form and dimensions of the meandering portions of the
10 electrodes.

In another aspect of the invention it is desirable for the electrodes of the sensor elements to be provided on the carrier on top of each other, separated from each other by an insulating layer. This is a reliable manner of manufac-
15 turing a very thin sensor mat.

It is further desirable for the resistive layer of the sensor elements to be provided on the electrodes, with both electrodes on the same side of the resistive layer.

In a further aspect of the invention it is advantageous for the resistive layer to be attached to the electrode
20 layer by means of a layer of adhesive, and that the layer of adhesive comprises aeration holes. Such aeration holes promote the contact of the resistive layer with the two electrodes when a load is applied on the sensor elements.

The effectiveness of the sensor elements of the sensor mat may be assisted by providing each sensor element separately with a support surface. This support surface at the position of the sensor elements and between the meandering portions of the electrodes helps the electrodes at that
25 position to be kept flat.

With reference to the drawing of a single figure the invention will be further elucidated below.

The figure shows a schematic top view of a portion of a sensor mat according to the invention. This sensor mat
35 comprises sensor elements 2 evenly distributed over the mat 1, each sensor element 2 having a first electrode 3 and a second electrode 4. The two electrodes 3 and 4 interact with a resistive layer provided on top of the two electrodes, such

that relative to the resistance at zero load, the application of a pressure load changes the electrical resistance between the two electrodes 3 and 4. As a rule one thing and another is designed such that a pressure load will produce a reduced
5 resistance between the first electrode 3 and the second electrode 4.

The figure shows in an illustrative manner that the sensor elements 2 are arranged in matrix form. These sensor elements 2 which as mentioned above comprise a first electrode 3, a second electrode 4, and (not shown) a resistive
10 layer provided on these two electrodes, are provided on a flexible carrier. This may, for example, be a polyester film or a carrier made from another suitable material. The figure further clearly shows that the sensor elements 2 that are
15 arranged in the same row or in the same column always share one row electrode or column electrode; see, for example, the row electrode 5 connecting a number of first electrodes 3 and the column electrode 6 connecting a number of second electrodes 4.

20 The figure also clearly illustrates that each row electrode 5 and/or column electrode 6 has a meandering path between the sensor elements 2.

It can further be observed that the various electrodes 3 and 4 of the sensor elements 2 are arranged on top of each other on the carrier while being separated from each other by an insulating layer so as to avoid short circuiting. This is not (or not clearly) shown in the figure but is completely known to the person skilled in the art so that there is no need for further explanation.

30 It is further remarkable that the resistive layer of the sensor elements 2 are provided on the electrodes 3, 4 with both electrodes together being located at the same side of the resistive layer. To conveniently accomplish this, the resistive layer is attached to the electrode layer 3, 4 by
35 means of a layer of adhesive, with aeration holes in the layer of adhesive. These aeration holes make it possible to press the resistive layer on to the various electrodes 3, 4 of the sensor elements 2, so as to make sensitive determina-

tion possible of the change in resistance caused by the pressure load between these electrodes 3, 4.

Finally, it is desirable for each sensor element 2 separately to be provided with a relatively rigid support surface to aid the measuring of the pressure load on the
5 respective sensor elements. This also is quite clear to the person skilled in the art, so that further explanation is not necessary.

CLAIMS

1. A sensor mat (1) for registering a pressure profile, comprising sensor elements (2) distributed over the mat (1) wherein each sensor element (2) has a first (3) and a
5 second electrode (4), which two electrodes interact with a resistive layer, such that a pressure load changes the electrical resistance between the two electrodes relative to the resistance at zero load, wherein the sensor elements (2) are provided on a flexible carrier in the form of a matrix and
10 wherein the sensor elements (2) that are placed in the same row or in the same column always share one row electrode (5) or column electrode (6), respectively **characterised** in that each row electrode (5) and/or column electrode (6) between the sensor elements (2) has a meandering path.

15 2. A sensor mat according to claim 1, **characterised** in that the electrodes (3, 4) of the sensor elements (2) are provided on the carrier on top of each other, separated from each other by an insulating layer.

20 3. A sensor mat according to claim 1 or 2, **characterised** in that the resistive layer of the sensor elements (2) is provided on the electrodes (3, 4), with both electrodes (3, 4) on the same side of the resistive layer.

25 4. A sensor mat according to claim 1 or 2, **characterised** in that the resistive layer is attached to the electrode layer (3, 4) by means of a layer of adhesive, and that the layer of adhesive comprises aeration holes.

5. A sensor mat according to one of the preceding claims, **characterised** in that each sensor element (2) separately is provided with a support surface.

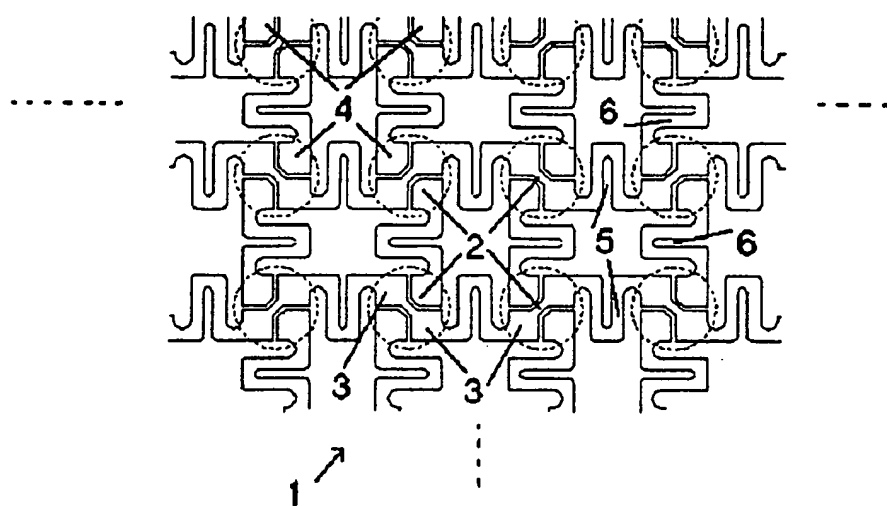


Fig. 1

INTERNATIONAL SEARCH REPORT

PCT/NL 02/00816

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01L1/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 16053 A (I.E.E. INTERNATIONAL ELECTRONICS & ENGINEERING S.A.R.L.) 23 March 2000 (2000-03-23) abstract; figures ---	1-3,5
X	US 5 010 774 A (K. KANAYA E.A.) 30 April 1991 (1991-04-30) column 15, line 12 - line 24; figures 23,24 ---	1
A	DE 42 37 072 C (MERCEDES-BENZ AKTIENGESELLSCHAFT E.A.) 2 December 1993 (1993-12-02) the whole document -----	1-5

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

8 document member of the same patent family

Date of the actual completion of the international search

24 March 2003

Date of mailing of the international search report

07/04/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl
Fax: (+31-70) 340-3016

Authorized officer

Van Assche, P

INTERNATIONAL SEARCH REPORT

PCT/NL 02/00816

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